Transforming to become an insight-driven utility

Recommendations for utilities as they evolve to a digitally enabled grid
Introduction: Defining a path to analytics-powered performance at utility companies

With the expansion of data sources from consumers, assets and third party data, coupled with the adoption of advanced metering infrastructure (AMI) and other asset sensors, utilities have ever-increasing amounts of data to which they can apply analytics to gain business insights.

While across the utility value chain there is increasing interest in the potential for analytics to inform better decision making, smart grid, is bringing to the fore some of the most complex opportunities: opportunities around which utilities should mobilize quickly, both for the benefit of their own financial performance, as well as their ability to comply with regulation.

According to the Accenture report, The Digitally Enabled Grid – Unlocking the Value of Analytics (2013), 96 percent of executives working in Transmission and Distribution, view data management as a key organizational capability to develop by 2020. What is less clear among those surveyed is how to transform from an organization that uses analytics on an ad-hoc basis into an organization that is powered by data and analytics.

Accenture has five recommendations for utilities in order to elevate and evolve their mastery of data to become an analytical leader:

1. Clearly articulate business priorities and design for analytics outcomes

2. Complete an assessment of existing capabilities: from data and technology to talent, culture and performance management

3. Consider process redesign and data quality and governance improvements in light of leading utility practices powered by analytics

4. Develop an analytics roadmap rooted in executive priorities and value-based outcomes

5. Promote a cultural shift to an analytically astute, insight-driven utility.
Clearly articulate business priorities and design for analytics outcomes

As data proliferates, the ability to identify relevant conclusions becomes more challenging. Consequently, though seemingly obvious, the task of asking the right questions is far from trivial. It also goes counter to traditional business intelligence methods, whereby utilities (and other businesses) have tended to conduct the process in exploratory ways, collecting and analyzing data in a progressive and in some cases ad-hoc manner.

Utility leaders need to target and prioritize the areas to be improved with data and analytics—be that related to core operations, such as asset reliability or demand response, or analytics related to enterprise domains such as human resources or finance. According to executives surveyed, the top three analytical areas for companies, representing greatest value from smart solutions deployments, are analytics related to grid operations (96%), asset management (92%) and outage management (85%).

Once the focal areas are identified, business leaders will benefit from thinking beyond silos, considering the application of analytics across processes, functions and assets. For example, precious insights could result from analytics applied to processes spanning both operations and enterprise.

Regardless of the focal area, the journey begins by asking the right questions. A director of operations, for example, needs to be more specific than to ask, “How accurate and reliable is our data”? “How up-to-date is our network-connectivity model and how accurate and reliable is the resulting data?” will yield a more insightful response.

Similarly, managers need to set quantifiable targets and KPIs against which analytics results can be evaluated and tracked. A priority such as “Improve customer satisfaction,” for example, will not yield the same quality of insight as “Reducing the customer average interruption duration index (CAIDI) by five minutes” or a “five percent improvement in estimated restoration time (ERT).”

Utilities not only need to collect the right data but, in many cases, need to identify missing data and assess the quality of existing data. To fill in the gaps, utilities will want to look for additional data sources, internal and external. A data-creation strategy requires setting up additional sources, including machine-to-machine, new software and data from partners. For example, several utilities have built on AMI deployments to improve transformer-premise connectivity information within their operational systems.

Complete an assessment of existing capabilities: from data and technology to talent, culture and performance management

The next step is an objective diagnostic of capabilities, measuring the gap between existing and desired future-state skills to achieve business objectives.

Data and technology spring to mind as key areas for assessment. Utilities will also want to evaluate maturity as it relates to end-to-end processes affected by analytics, as well as data discovery, overall data management, analytics talent, organizational culture and performance management.

The Accenture Analytics Maturity Model for Utilities (Figure 1) shows how organizations can chart where they are today and where they have room to grow to deliver on their business priorities. All capabilities (left column) are important, but it is in combination that a utility can grow to become an analytics leader. A utility leader with analytics is characterized by one where the discipline is embedded in its operational essence.
## Figure 1. Accenture analytics maturity model for utility companies

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<tr>
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<td><strong>Analytical novices</strong></td>
<td>Use of analytics on an ad-hoc basis by individuals within a utility.</td>
<td>Use of some analytical tools but limited to discrete functions and not widely understood.</td>
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<td>Frequently missing and poor quality data tends to be internal and unstructured. Depending on assets, utilities use different data marts.</td>
<td>Data model integrated at the asset level. Operational technology (OT) and information technology (IT) data remain separate. Data is typically collected and analyzed on a daily or less frequent basis, with some manual aggregation and reporting at a departmental level.</td>
<td>Data is structured in a central environment. Some intra-day data availability. Evolution of enterprise data model focused on delivering value.</td>
<td>Starting to combine structured and unstructured data. Capability for rapid discovery to visualize and analyze large volumes of data. OT and IT data are well integrated, and data is enriched through third-party sources.</td>
<td>Data models conform across OT and IT. Strong capability to store and analyze structured and unstructured data, generated internally and externally, at speed. Collection methods designed into technology and process.</td>
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<td><strong>Centralized analytics</strong></td>
<td>Reliance on Excel and Access. Systems lack integration.</td>
<td>Disparate data warehouses and isolated databases. OT and IT work in silos, with manual data integration.</td>
<td>Big data technology provides insight from structured, high-volume and high-velocity data. Discovery identifies areas with high value that can be promoted to a more traditional analytic data warehouse, resulting in a hybrid technology landscape. OT and IT systems begin to converge.</td>
<td>Maturation of the hybrid landscape combines big data and traditional data warehouse. Utilities introduce a service framework to support mobile and Web-based apps, and use increasingly sophisticated tools for visualization.</td>
<td>Utilities benefit from a well-integrated data-service platform, from which they develop business-specific applications. The landscape includes an in-memory platform for faster insight, and fully integrated Web apps. In support of advanced analytics, utilities possess the ability to store low-level data longer.</td>
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<td><strong>Analytical companies</strong></td>
<td>Basic analytics being used to improve current processes, but lack of vision on how analytics could deliver insight for improved processes.</td>
<td>Utilities conduct some statistical analyses (e.g., Monte Carlo simulations, as well as risk and variance analyses), but the focus is limited to specific activities rather than end-to-end processes.</td>
<td>Scope broadens, with central data cleansing, charting and high-level mapping of performance indicators. Most work is done in the realm of business intelligence, using historical data rather than real-time data and advanced analytics.</td>
<td>Approach to process improvement relies on data-driven analysis. Well-mapped processes enable better collaboration across functions. Some issues, however, are seen as unique, thus limiting data sharing and best practices.</td>
<td>Analytics activities are integrated throughout the utility. Advanced analytics are built into end-to-end processes, thereby helping utilities improve reliability, control costs and improve service.</td>
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**Strategic focus**
- Use of analytics on an ad-hoc basis by individuals within a utility.
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- Shared toolset for strategic decisions. Varied use by function, primarily for key performance indicators (KPIs) and dashboards.
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- Organization-wide use. Scenarios and predictive analytics shape and influence operational and strategic decisions.

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**Technology**
- Disparate data warehouses and isolated databases. OT and IT work in silos, with manual data integration.
- Big data technology provides insight from structured, high-volume and high-velocity data. Discovery identifies areas with high value that can be promoted to a more traditional analytic data warehouse, resulting in a hybrid technology landscape. OT and IT systems begin to converge.
- Maturation of the hybrid landscape combines big data and traditional data warehouse. Utilities introduce a service framework to support mobile and Web-based apps, and use increasingly sophisticated tools for visualization.
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**Process**
- Basic analytics being used to improve current processes, but lack of vision on how analytics could deliver insight for improved processes.
- Utilities conduct some statistical analyses (e.g., Monte Carlo simulations, as well as risk and variance analyses), but the focus is limited to specific activities rather than end-to-end processes.
- Scope broadens, with central data cleansing, charting and high-level mapping of performance indicators. Most work is done in the realm of business intelligence, using historical data rather than real-time data and advanced analytics.
- Approach to process improvement relies on data-driven analysis. Well-mapped processes enable better collaboration across functions. Some issues, however, are seen as unique, thus limiting data sharing and best practices.
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### Maturity Levels Overview

**Level 1**: Analytical novices  
**Level 2**: Localized analytics  
**Level 3**: Centralized analytics  
**Level 4**: Analytical companies  
**Level 5**: Analytical leaders

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| Organization | No clear ownership of data, with inconsistent and variable data points. | Efforts remain siloed, with data "owned" by function and limited to business intelligence. The scheme for data classification is relatively simple. KPIs are limited to a single data source. Delivery models are inflexible. | The data governance structure defines roles and responsibilities for managing and analyzing data, along with data reference models and data management. Analytics toolset facilitates key metrics, and analytics are pooled and insights produced for organizational benefit. | Data across processes is owned with clear accountability, and a system provides rewards. Utilities fill the chief data officer (or similar position). Insights from data are well understood, and decision making is rooted in data. Analytics think tanks focus on key challenges. |

| Talent | Analytics skills are limited to talent within the current workforce. | Analytics is built into some role definitions and job descriptions. Capability development is typically on an as-required basis. | Broad reference to analytics across job functions and levels. Analytical skills are valued, and people are trained to use new tools. Utilities recruit experienced people with specific capabilities. | Analytical capabilities pervade the utility. Key business processes have dedicated data and analytical owners. Insight, based on analytics, is embedded into processes, leading to development of improved reliability and service. |

| Culture & Performance Management | Analytics skills and capabilities are not widely understood. | Rewards and recognition for analytical capabilities vary. | Analytical competence is encouraged through performance monitoring. Training curricula are aligned to individual development. Appropriate metrics are being tracked, and data is relied on to deliver insight, thereby leading to better and faster decisions. | Individuals understand how data leads to insight. Specific performance factors are associated with analytical competency. People are held accountable for data integrity. Leadership displays analytical competence and spotlights data-driven improvements. | Performance management system leads to broader use of analytics. Analytic performance is inherent in all job descriptions. New ideas based on analytical insights are rewarded. Increased level of maturity attracts experienced talent. |

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Identifying where the utility is on the analytics maturity curve enables executives to identify and plan for improvement. A former CEO of an integrated electricity company explained the challenges: “From a retail perspective, we’re realizing less than 10 percent of the potential of analytics; however, we’re around 40 percent of the way to understanding what we need to do to get there. In supply and transmission, we’re realizing less than five percent of the potential, but we don’t really know how to get to the next level.”

Aligning the analytics maturity model to specific operations or enterprise domains, will enable a utility to define its own specific journey.
Figure 2 shows how a utility might chart a journey to improved reliability and customer satisfaction in relation to enterprise outages. Some utilities are relative novices in this area, using ad-hoc analyses of estimated restoration time (ERT) during storms. More mature players may use homegrown analytics and reporting packages within distribution operations to track ERT and reliability metrics. As advanced analytics become pervasive organization-wide, predictive modeling of storm impact becomes a key input into emergency preparedness across the enterprise.

Figure 2. Charting a journey to improve outage analytics

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Analytical novice

- **Data**
  - Connectivity model is missing elements for accurate calculation of customer-level ERT.

- **Technology**
  - Reliance on Excel and Access. Systems lack integration to develop storm work plans.

- **Process**
  - Basic (manual) analytics provide customers and stakeholders with global and municipal ERTs.

- **Organization & talent**
  - Information entered by field crews is frequently inaccurate. Analytics skills limited to a few in distribution operations.

- **Culture & performance management**
  - Analytics skills and capabilities are not widely understood.

Intermediate analytical adopter

- **Data**
  - Analytics and reporting built directly on operational management systems and published as needed. May use an operational data warehouse.

- **Technology**
  - Use of operational data warehouses, datamarts for outage data, and business intelligence tools for custom reports.

- **Process**
  - Outage and restoration processes are analyzed across systems and organizations to identify data-quality issues. KPIs are established to improve process adherence.

- **Organization & talent**
  - Regional offices held accountable for crew performance, process adherence and field data. Distribution Operations can (with IT support) augment outage analytics on existing platform.

Analytical leader

- **Data**
  - Data models, definitions and enterprise-wide data management are in place with clarity on ownership. Structured and unstructured data (e.g., weather feeds, social media) enhance predictive modeling.

- **Technology**
  - Big data management and analytics, with underlying technology for outage/grid analytics across control center, distribution, customer service, external affairs and shared services.

- **Process**
  - Outage analytics are an integral part of emergency preparedness and post-storm feedback. Processes are continuously monitored for data quality and consistency.

- **Organization & talent**
  - Managers and employees across the organization are evaluated by KPIs pertaining to executive priorities, such as customer satisfaction and reliability.

- **Culture & performance management**
  - Managers encouraged to consult outage analytics and storm situational awareness tools for decision support.
Consider process redesign in light of leading utility practices powered by analytics

Most utilities face challenges related to data availability, quality and integration. Whether the gaps are data- or technology-related, the common cause is a break in end-to-end processes. As an example, consider the operations director again and analytics related to his/her connectivity model. As the connectivity model evolves from the as-built-state, reporting back subsequent changes from the field, or manually mapping new process steps back into the system, may take weeks or months. Such a ‘break’ in the accuracy of the stated process will clearly affect the quality of the resulting analytics. Here are some ways utilities can move forward:

**Define an organization-wide analytics strategy and communicate changing practices.** When utilities view processes as parts of a lifecycle, it is easier to see how data and analytics are important to multiple functions. Utilities stand to gain by developing an integrated analytics strategy, communicating changes in end-to-end processes.

**Evaluate processes in light of innovative practices.** A review of impacted processes from end-to-end can identify potential gaps, as well as data accuracy and quality issues, and inconsistencies between systems that might undermine the value of the analytics. More importantly, this review can highlight process improvements that build on analytical capabilities to deliver greater business value.

For insight into industry-specific process improvements, utilities can benefit from consulting established business process models which synthesize leading practices from across the industry.

Develop an analytics roadmap rooted in executive priorities and value-based outcomes

Once a utility has performed an objective assessment of its current state, it should evaluate the costs and the benefits associated with moving up the data and analytics maturity curve. Organizations can evaluate desired outcomes in terms of executive priorities and what it will take to reach the next level of maturity.

The quantification of benefits ideally takes the form of a business case, highlighting financial savings in business operations and data management expenditure, as well as improved capital efficiency. Benefits can also be evaluated by tracking KPIs at each step of the journey.

Monitoring progress allows executives to execute to an analytics roadmap with value-based milestones. For instance, a utility at Level 1 might initially be well served with a roadmap that delivers quick wins—via supply chain, customer or asset analytics—within the context of a multi-year journey to become a leader in enterprise data management and analytics.

Promote a cultural shift to an analytically astute, insight-driven utility

Utilities can take several actions to promote integration of insight-to-action processes:

**Senior executives lead by example.** Corporate executives in many utilities are now supporting their own business decisions with data-driven analysis, and that is a promising development.

**Attract, develop, and retain data and analytics talent.** One of the greatest challenges to promoting an analytics mindset is the shortage of data and analytics talent. Accenture research indicates that only 25 percent of survey respondents believe their utilities are very well positioned to compete for analytics skills in the market. Consider innate yet untapped analytical capabilities, and put in place intuitive tools, processes and development opportunities to make the most of the available talent.

**Foster new behaviors with a change enablement program.** An analytical mindset is not innate to the majority. Developing a data and analytics-driven organization has many change components; including the process of “proving value” with proof of concepts using an agile methodology. Failure is also possible, thus the phrase, “prove value or fail fast,” being acceptable in the emerging culture. Utilities will also want to offer training on methods and approaches to use statistics, quantitative analysis and information modeling to gain insight and make better business decisions.

“...what was previously considered the ‘soft’ side of analytics, is actually increasingly the hard part to crack”.

Mike Smith, Vice President – Utility Analytics Institute
Accenture analysis of industry data suggests that a conservative estimate for using smart-grid analytics to transform operating results could approach $40 to $70 per electric meter annually. The potential gains compel leaders to industrialize the discipline of using analytics to drive improvements organization-wide.

Rather than focus exclusively on a long-range program to become an analytics leader, however, a utility might want to consider data discovery disciplines to derive use case hypotheses and develop prototypes rapidly to demonstrate value gains year after year.

A long-range holistic approach increases the likelihood of generating greater insight to improve results throughout the organization. For the long term, integrated actions across data, technology, process, people and culture represent a balanced approach to executing a successful strategy that leads organizations on a journey from issues to improved business outcomes.

Realize value at each step of the journey
Footnotes

1 Research on the utilities analytics landscape, conducted for Accenture by 10EQS, including interviews with executives.

2 Accenture High Performance Utility Model synthesizes leading practices in business process modeling. These practices have been derived from Accenture’s work with 400 utilities throughout the world. As an integrated framework of industry-specific process knowledge and field-tested assets, the High Performance Utility Model helps utilities compare their performance in specific areas with industry leaders, then prioritize improvement projects, and use the High Performance Utility Model to accelerate the pace of change.


What is the path toward the future digital grid?

Accenture's Digitally Enabled Grid program provides actionable insights and recommendations around the challenges and opportunities utilities face along the path to a smarter grid. Drawing upon primary research insights from utilities executives around the world as well as Accenture analysis, The Digitally Enabled Grid examines how utilities executives expect smart grid technologies and solutions to contribute to their future networks.

For more information on Accenture's Digitally Enabled Grid program, go to www.accenture.com/digitallyenabledgrid.

About Accenture Smart Grid Services

Accenture Smart Grid Services focuses on delivering innovative business solutions supporting the modernization of electric, gas and water network infrastructures to improve capital efficiency and effectiveness, increase crew safety and productivity, optimize the operations of the grid and achieve the full value from advanced metering infrastructure (AMI) data and capabilities. It includes four offering areas which cover consulting, technology and managed solutions: Work, Field Resource Management; Transmission & Distribution Asset Management; Advanced Metering Infrastructure and Grid Operations.

About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with approximately 293,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world’s most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$28.6 billion for the fiscal year ended Aug. 31, 2013. Its home page is www.accenture.com.